

Application No. 11/720,607  
Attorney Docket No. 2003B126

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REMARKS

Claims 13, 16, 18-21, 25-27, 30-39, and 44-50 are pending in the case.

Claims 1-12, 14-15, 17, 22-24, 28-29, 40-43, and 51 have been cancelled.

Claims 46-50 are withdrawn from consideration as being directed to non-elected subject matter.

Thus, Claims 13, 16, 18-21, 25-27, 30-39, and 44-45 are under consideration by the Examiner.

Steam cracking of crude produces the desirable products ethylene, propylene and butene, which are in large measure the building blocks of the petrochemical industry. Acetylene and dienes are also produced, and these are typically undesired products. These undesirable products can be hydrogenated, but a problem is over-hydrogenation to alkanes and "green oil", the latter of which decreases the life of the hydrogenation catalyst. The present invention relates to an improved selective hydrogenation catalyst, a process for making a catalyst, and (currently withdrawn from consideration) a process for the selective hydrogenation of alkynes and diolefins to olefins using said catalyst. Specifically, the claims under consideration are directed to (i) a catalyst consisting of rhodium and indium and an optional third metal, different from rhodium and indium and selected from iron, cobalt, and ruthenium, wherein said first and second metal components, as well as the third component, when present, are predominantly contained in an outer surface layer of the support having a depth of not more than 300 microns; and (ii) a method for making said catalyst.

Uzio et al. (US 6,498,280) is directed to a catalyst useful for paraffin dehydrogenation comprising, in the examples, platinum, tin, indium, lithium, chlorine. Even catalysts used in the comparative examples comprised these same metals. It is

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believed that the present claims preclude the possibility that Uzio et al. suggests the present invention.

Rende et al. (U.S. 6,486,370) requires the use of a promoter metal such as tin and a modifier metal such as lithium, both of which are excluded by the present claim language.

Shepherd et al. (U.S. 6,503,866) is directed to a reduced surface area alumina catalyst with improved crushing strength and prepared using a high temperature calcination step from about 700°C to about 900°C (also compare with the present Claim 44, which calls for a calcination from about 100°C to about 600°C).

Shepherd is interested in the strength of the support, not the active metals. All of the metals are described as optional. There is an *optional* platinum group metal (which includes the rhodium required in the present invention), an *optional* Group 14 metal (e.g., tin), and a plethora of *optional* catalyst modifiers (including indium), "catalytically effective amounts of [which] may be added in any suitable manner". See col. 5, lines 64+.

With regard to the platinum group metal, the reference states clearly that generally the metal is dispersed homogeneously in the catalyst. It does teach that the platinum group metal may be concentrated in the surface layer, tapering off in progressing to the center of the catalyst particle. See the discussion beginning in the last paragraph of col. 2 of the reference.

The present claims, however, require that the rhodium and indium component as well as the optional third component be present in the eggshell structure-type. This is not fairly suggested in the reference. The reference suggests only that the Group 14 metal - e.g., tin - is to be dispersed throughout the porous carrier material" (col. 5, about line 33). It never suggests that any metal other than the platinum group metal be dispersed in the eggshell structure-type (and again, the dispersion of the platinum group metal in the eggshell structure is clearly a secondary choice for the reference).

As discussed above, however, the present specification contains a showing of unexpected results for the egg shell structure-type over uniform dispersion. See

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paragraphs [0081] through [0085] and Table 4 on page 22 of the specification (formerly "Table 3" on page 22). The data shows that the egg shell structure is superior to the uniform distribution for compositions according to the present invention. This is not fairly suggested by Shepherd et al.

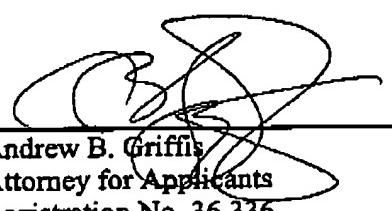
For the above reasons, it is respectfully urged that none of the references of record fairly suggest the present invention, and it is requested that the rejections be withdrawn.

There were two objections made in the previous Official Action. The first, related to Claim 51, is believed cured by cancellation of that claim. The second, related to the mislabelling of the second "Table 3", is believed cured by the Amendment to the Specification provided on page 2 of this response.

There being no further issues, Applicants respectfully urge that the present application is in condition for allowance and early indication of such is earnestly solicited.

Respectfully submitted,

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Date

  
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